

What Is Claimed Is:

1 1. In a data storage array having data storage elements and a parity
2 storage element, wherein each of the data storage elements store a respective data
3 block and the parity storage element stores a parity block, the parity block being
4 based on the data blocks, a method for reading data blocks, the method
5 comprising:
6 reading data blocks sequentially from respective data storage
7 elements;
8 determining if any of the data blocks are bad as the data blocks are
9 being read;
10 accumulating parity of the good data blocks as the data blocks are
11 being read;
12 reading the parity block from the parity storage element; and
13 reconstructing a bad data block from the accumulated parity of the
14 good data blocks and the parity block.

1 2. The method of claim 1 wherein:
2 accumulating parity of the good data blocks includes exclusive
3 ORing the parity of the good data blocks read prior to the current good data block
4 being read with the current good data block being read.

1 3. The method of claim 2 wherein:
2 reconstructing a bad data block includes exclusive ORing the
3 accumulated parity of the good data blocks with the parity block.

1 4. The method of claim 1 further comprising:

2 storing the good data blocks read after the bad data block until the
3 bad data block is reconstructed to preserve ordering of the data blocks during
4 reading.

1 5. A data storage array system for reading data blocks, the system
2 comprising:

3 data storage elements each storing a respective data block;
4 a parity storage element storing a parity block based on the data
5 blocks;

6 a controller for reading data blocks sequentially from respective data
7 storage elements and the parity block, the controller operable for determining if
8 any of the data blocks are bad as the data blocks are being read; and

9 a parity accumulator for accumulating parity of the good data blocks
10 as the controller reads the data blocks, wherein the controller reconstructs a bad
11 data block from the accumulated parity of the good data blocks and the parity
12 block.

1 6. The system of claim 5 wherein:

2 the parity accumulator accumulates parity of the good data blocks
3 as the data blocks are being read by exclusive ORing the accumulated parity of the
4 good data blocks read prior to the current good data block being read with the
5 current good data block being read.

1 7. The system of claim 6 wherein:

2 the controller reconstructs a bad data block by exclusive ORing the
3 accumulated parity of the good data blocks with the parity block.

1 8. The system of claim 5 further comprising:

2 a buffer for storing the good data blocks read by the controller after
3 the bad data block until the controller reconstructs the bad data block to preserve
4 ordering of the data blocks during reading.

1 9. The system of claim 5 wherein:
2 the storage elements are magnetic tape drives.

1 10. The system of claim 5 wherein:
2 the storage elements are magnetic disk drives.

1 11. The system of claim 5 wherein:
2 the storage elements are a track of a magnetic tape.

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1 12. In a magnetic tape having data blocks and a parity block
2 serially arranged, the parity block being based on the data blocks, a method for
3 reading data blocks, the method comprising:
4 reading data blocks sequentially from the magnetic tape;
5 determining if any of the data blocks are bad as the data blocks are
6 being read;
7 accumulating parity of the good data blocks as the data blocks are
8 being read;
9 reading the parity block from the magnetic tape; and
10 reconstructing a bad data block from the accumulated parity of the
11 data blocks and the parity block.

1 13. The method of claim 12 wherein:

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3 accumulating parity of the good data blocks includes exclusive
4 ORing the parity of the good data blocks read prior to the current good data block
being read with the current good data block being read.

1 14. The method of claim 13 wherein:
2 reconstructing a bad data block includes exclusive ORing the parity
3 of the good data blocks with the parity block.

1 15. The method of claim 12 further comprising:
2 storing the good data blocks read after the bad data block until the
3 bad data block is reconstructed to preserve ordering of the data blocks during
4 reading.

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2 16. A data storage array system for reading data blocks, the
3 system comprising:
4 magnetic tape having data blocks and a parity block based on the
5 data blocks;
6 a controller for reading data blocks sequentially from the magnetic
7 tape and for reading the parity block from the magnetic tape, the controller
8 operable for determining if any of the data blocks are bad as the data blocks are
9 being read; and
10 a parity accumulator for accumulating parity of the good data
11 blocks as the controller reads the data blocks, wherein the controller reconstructs
12 a bad data block from the accumulated parity of the good data blocks and the parity
block.

1 17. The system of claim 16 further comprising:

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a buffer for storing the good data blocks read by the controller after
the bad data block until the controller reconstructs the bad data block to preserve
ordering of the data blocks during reading.

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